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COLLECTING AND WEIGHING TUBE FOR INSECTICIDAL AEROSOLS

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A swinging-shutter apparatus for dispensing accurately measured small dosages of insecticidal aerosol into a Peet-Grady chamber is described in ET-239. Brief mention is made of a T-tube, which is fitted over the 1-inch opening in the chamber and is used to collect and to weigh the small amounts of aerosol released into the chamber. The present paper tells how to construct and operate this tube.

The assembled T-tube is shown in figure 1, and a diagrammatic drawing in figure 2.

Description of Tube

The T-tube consists of two parts, the roughly T-shaped body (fig. 2, A) and an insert (fig. 2, B) that fits into one end of the T. A piece of filter paper is fitted over the larger end of the insert before it is pushed into the tube. The T-tube and insert are made of lightweight sheet metal about as thick as the metal used in tin cans.

At the end of the body of the T-tube away from the insert, a collar 3/8 inch wide extends inward (fig. 2, C). This collar reduces the diameter of the opening in this end to 1 1/4 inches.

The end of the insert that fits inside the T-tube joins a collar that extends out beyond it for 1/4 inch, forming a shoulder that fits against the end of the T-tube when the insert is in place. On the opposite side of this collar is the tube that connects with the suction. This end of the insert fits snugly over the suction tube of a hand vacuum cleaner.

A filter paper of the type used for quantitative analysis, in this case 5 inches in diameter, was used.

Operation of the Tube

The weighed tube, with the filter paper in place, is held inside the Peet-Grady chamber over the aerosol-discharge point (fig. 1). The 1 1/4-inch opening in the tube is placed over the 1-inch opening in the wall of the Peet-Grady chamber. The tube is held about 1/8 inch from the wall by three pieces of cork 1/4 inch square glued to a piece

of cardboard 4 inches square. The cardboard has a 1 1/2-inch hole in it which encircles the hole in the chamber wall.

The nozzle of the vacuum cleaner is pushed into the insert tube and the electricity turned on. The desired quantity of aerosol is then released into the Peet-Grady chamber with the aid of the swinging-shutter apparatus. Suction through the T-tube from the vacuum cleaner draws the air carrying the aerosol through the filter paper. This paper prevents the escape of the nonvolatile material, the weight of which is determined by weighing the tube before and after the aerosol is released.

Weighings

The various T-tubes tested, with the insert and filter paper in place, weighed from 84.4 to 99.1 grams. With tubes of this size range weighings could be made on the usual type of analytical balance.

Sufficient swings of the shutter were made to deliver approximately 100 mg.($\pm$ 2.5 mg.) of nonvolatile material for each weighing.

If the humidity in the room changed considerably while the samples were being taken or the weighings made, the weight of the tubes was affected. For this reason the tubes were cleaned in acetone instead of water. After the acetone had evaporated the filter papers were inserted and the tubes allowed to stand several hours, or preferably overnight. Tubes that were exposed to the suction in the Peet-Grady chamber but did not receive any aerosol were run as checks in each series.

Discussion

The aerosol-collecting tube described above was evolved from a number of earlier models that were not entirely satisfactory. The problem was to remove completely the fine particles of aerosol from the air without loss, and in a device that could be weighed accurately. The aerosol was discharged intermittently. Excessive suction on the opening to the swinging shutter might draw aerosol particles into the tube that would not enter the Peet-Grady chamber in a normal test.

Filter paper was chosen as the best filter because of its availability and uniformity, and because the size of the pores through the filter paper was known. It was also inexpensive and could be easily and rapidly changed in the T-tube. A good quality of paper was used to avoid variability in texture and to reduce the likelihood of tearing.

When a puff of aerosol was released by the swinging shutter into a tube without a side opening, it tended to bounce back and deposit material on the edges of the hole in the Peet-Grady wall and on the shutters. The side tube allowed a puff of aerosol to rise in it and, before it overflowed, to be drawn back through the filter paper. The side tube was pointed up so that the drops of aerosol that traveled

through the air stream would settle into the tube. Had the side tube been pointed down, some of the drops might have fallen out. The 3/8-inch collar on the end of the T-tube next to the aerosol inlet caught some of the larger drops of aerosol and deflected the air-borne particles into the center of the tube, where they were drawn back to the filter paper.

The 1/8-inch crack between the tube and the wall of the Peet-Grady chamber allowed air to flow into the tube at this point, preventing the escape of aerosol particles, and also reducing the possibility of their being drawn into the collecting tube from the swinging-shutter cabinet when the shutter was not open.

It should not be assumed that all the aerosol particles were collected on the filter paper as deposits could be easily detected after collecting a sample on the inside of the T-tube.

This apparatus might be useful for collecting various types of air-borne insecticide drops, or particles.

Summary

A light sheet-metal tube for collecting air-borne particles of insecticidal aerosols generated by liquefied gas by means of a small vacuum cleaner drawing the air through filter paper is described. The nonvolatile material in the aerosol solution is collected in the tube and filter paper and weighed.

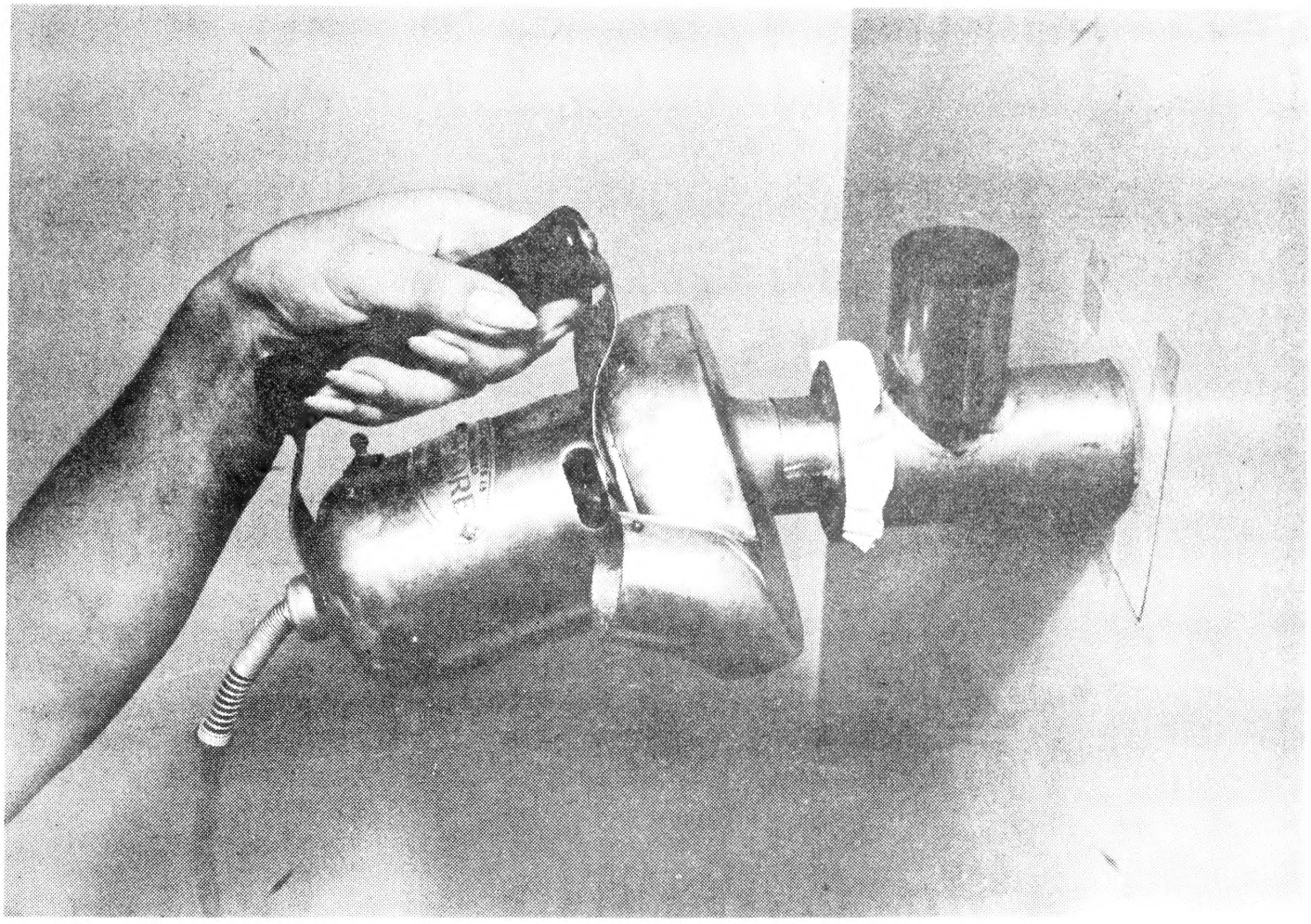
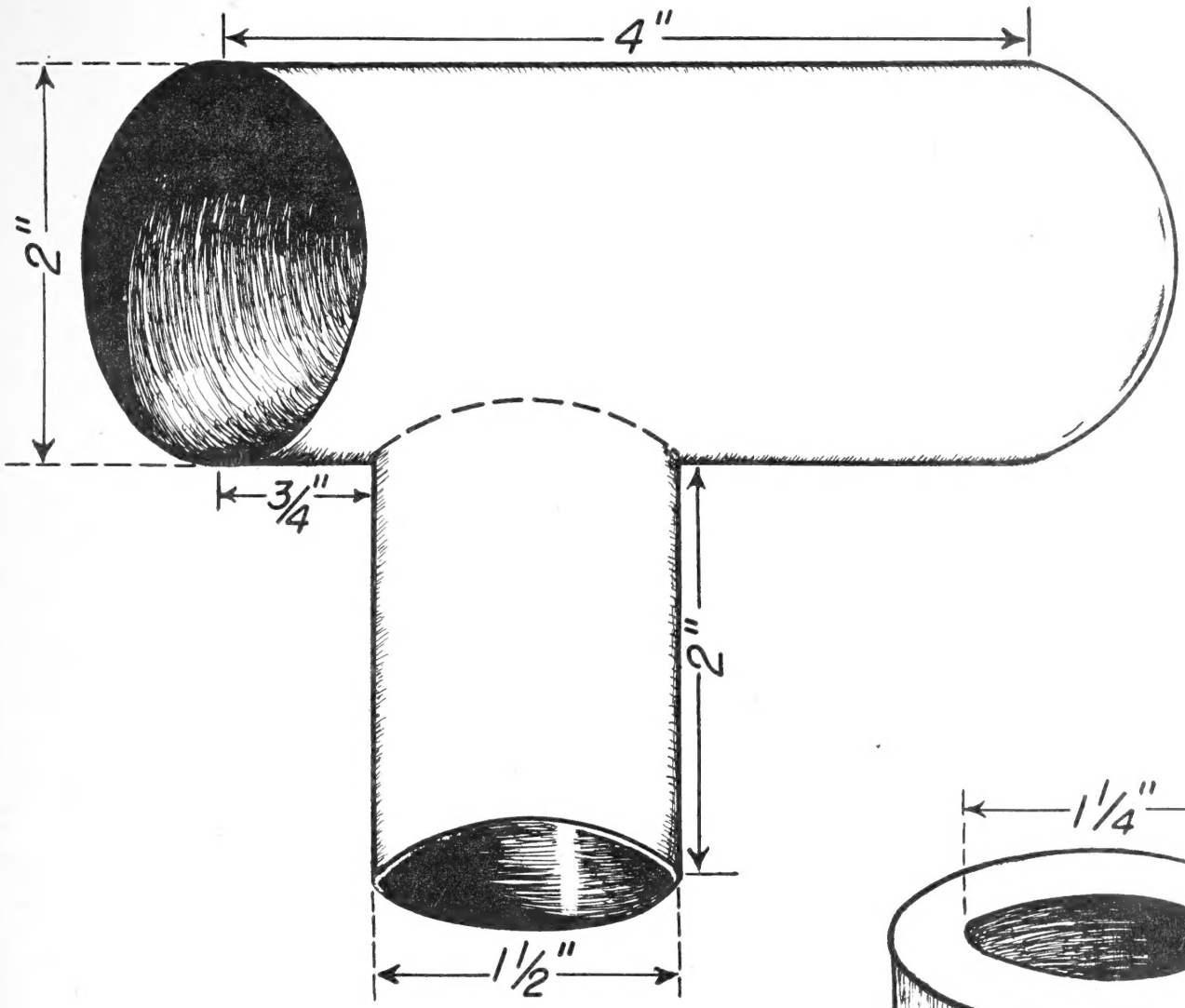
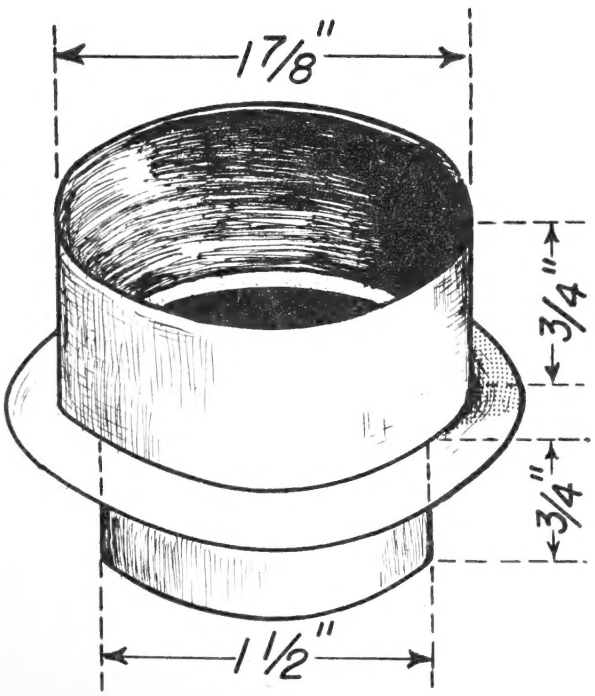


Figure 1.--Collecting aerosol with T-tube and vacuum cleaner in position. The aerosol discharge opening is in the center of the cardboard on the wall of the Peet-Grady chamber at right.



A



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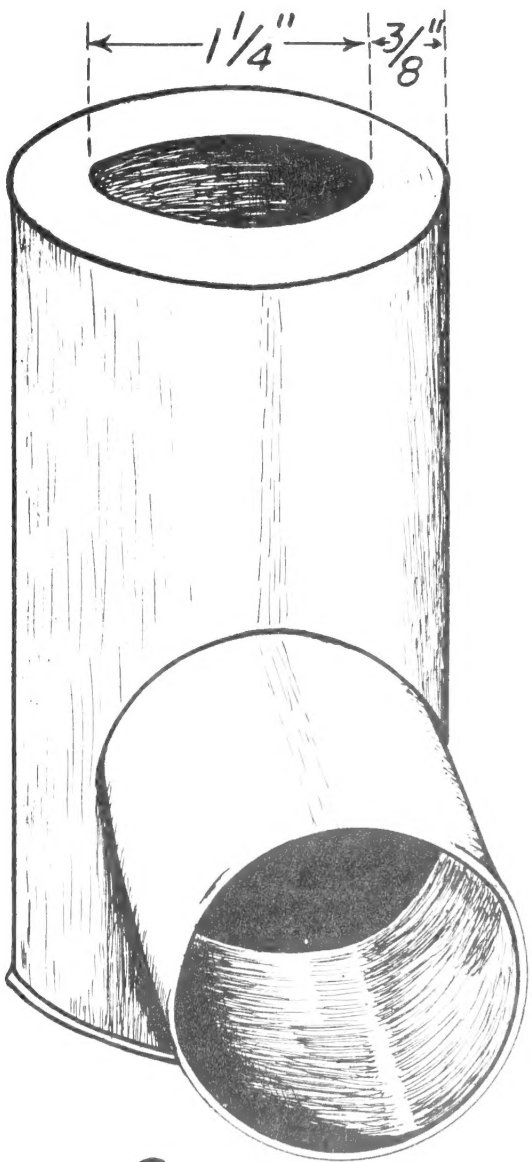

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